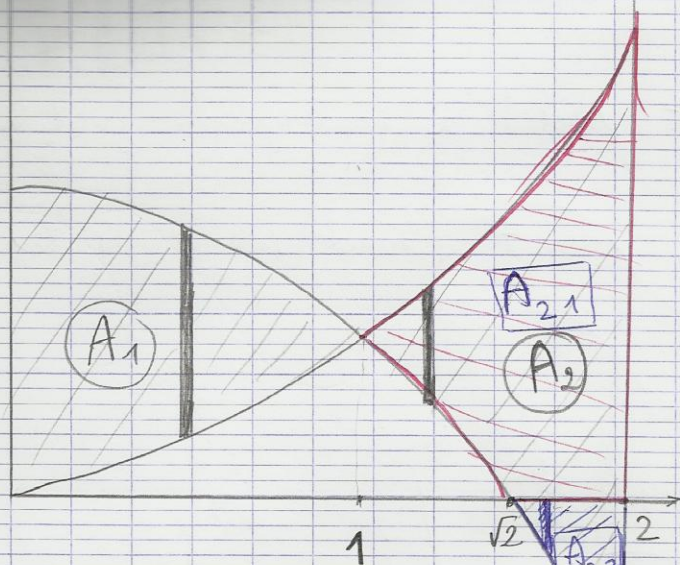


$$y = x^2 \text{ \& } y = 2 - x^2, \quad 0 \leq x \leq 2$$



why is the area in the negative partition is not considered?

$$A = \int_0^1 [2 - x^2 - x^2] dx + \int_1^2 [x^2 - (2 - x^2)] dx = \checkmark$$

Proof

$$A_2 = A_{21} + A_{22}$$

$$A_{21} = \int_1^{\sqrt{2}} [x^2 - (2 - x^2)] dx + \int_{\sqrt{2}}^2 x^2 dx$$

$$A_{22} = \int_{\sqrt{2}}^2 (0 - (2 - x^2)) dx = \int_{\sqrt{2}}^2 [-(2 - x^2)] dx$$

$$\therefore A_2 = \int_{\sqrt{2}}^2 [x^2 - (2 - x^2)] dx + \int_1^{\sqrt{2}} [x^2 - (2 - x^2)] dx$$

$$A_2 = \int_1^2 \cancel{(x^2 - (2 - x^2)) + x^2 - 2 + x^2} dx =$$

$$\therefore A_2 = \int_1^2 [x^2 - (2 - x^2)] dx \quad \checkmark$$

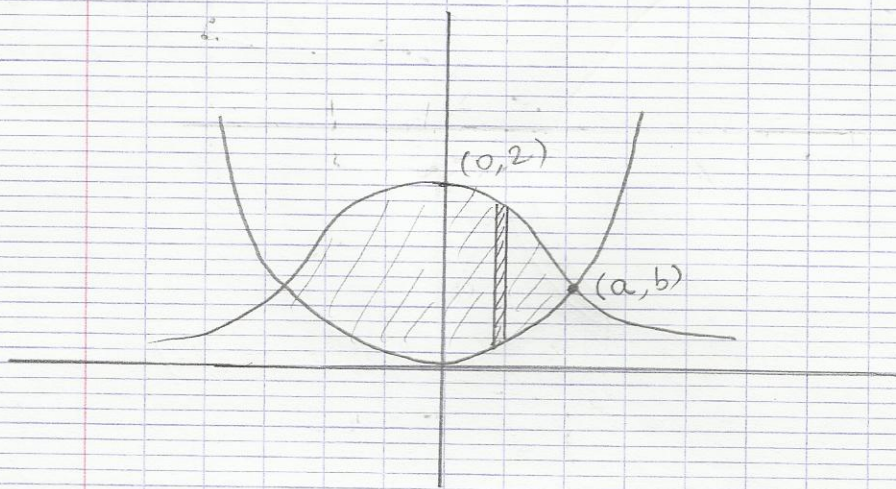
Area
between

$$y = x^2$$

$$y = \frac{2}{x^2 + 1}$$

I won't sketch a good graph-- just a rough

$$y = \frac{2}{x^2 + 1} \rightarrow \text{even } f^n, \text{ max. value is } (0, 2)$$

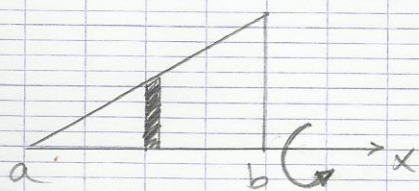


$$A = 2 \int_0^a \left[\frac{2}{x^2 + 1} - x^2 \right] dx = \pi - \frac{2}{3}$$

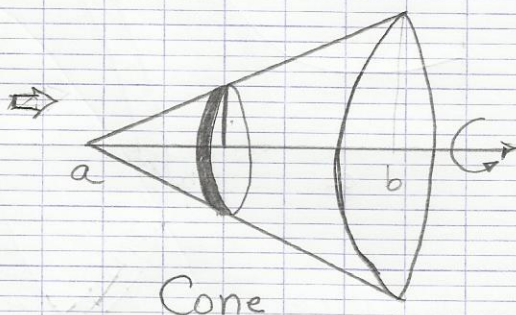
6.2 Volumes

"Volumes of solids got by revolving certain bounded area about (x-axis) or (y-axis)"

Ex:



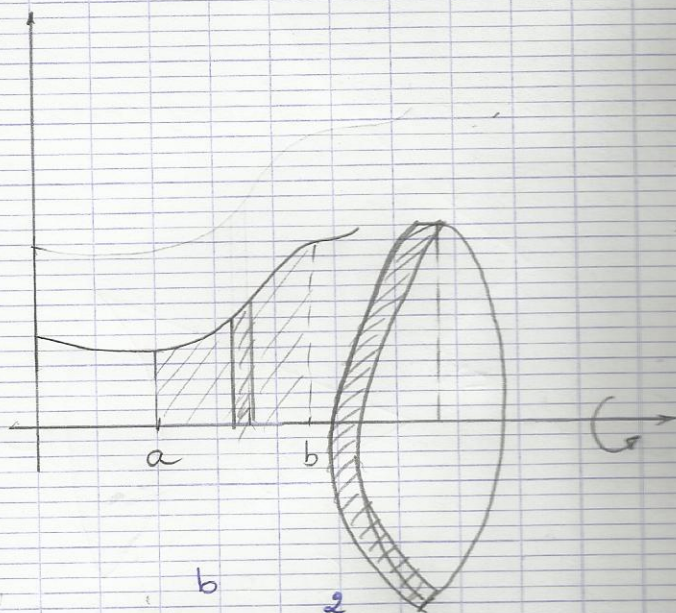
$$A = \int_a^b f(x) dx$$



$$A = \pi r^2 H$$

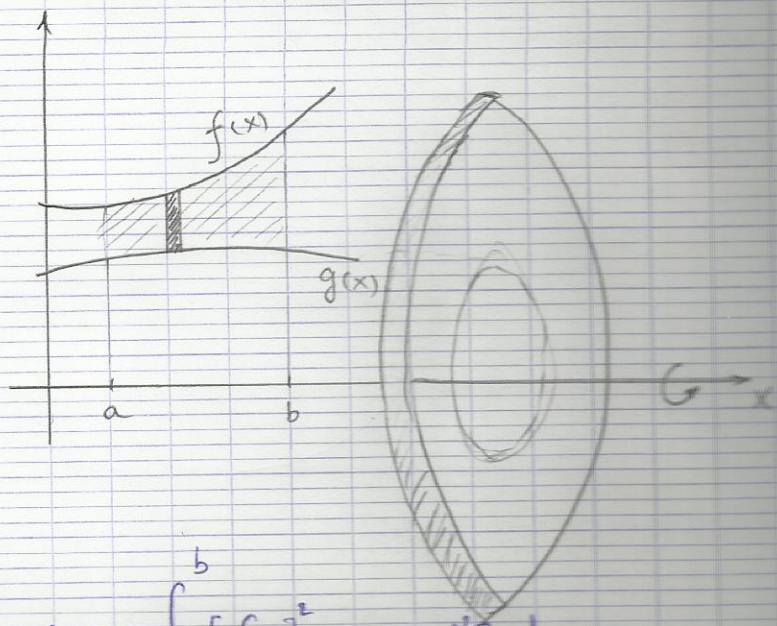
$$V = \int_a^b \pi (f(x))^2 dx = \pi \int_a^b (f(x))^2 dx$$

1. The Method of Disks:



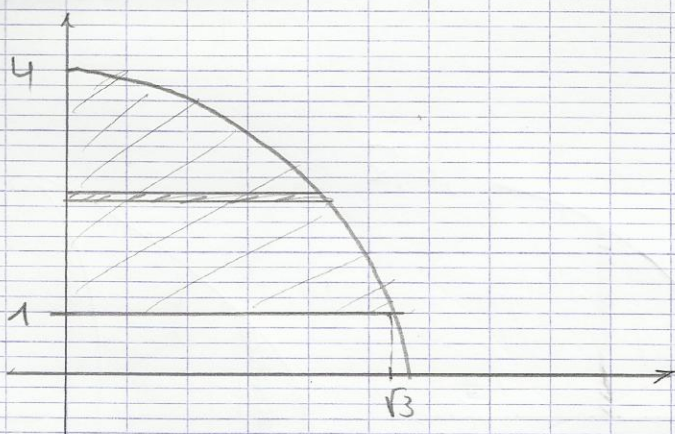
$$V = \pi \int_a^b [f(x)]^2 dx$$

2. The Method of Washers:



$$V = \pi \int_a^b [f(x)^2 - g(x)^2] dx$$

Ex. $y = 4 - x^2$, $y = 1$, $x = 0$, $x = \sqrt{3}$



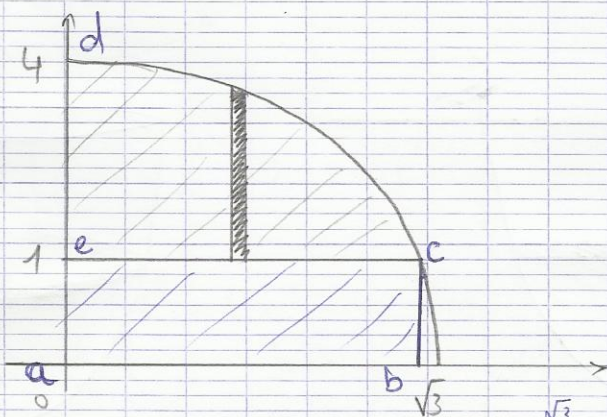
1, Volume about y-axis "Disk"

$$V = \pi \int_1^4 [\sqrt{4-y}]^2 dy = \checkmark$$

$$x^2 = 4 - y$$

$$x = \pm \sqrt{4 - y}$$

2, Volume about x-axis "washer"



$$V_1 = V_{abcd} = \pi \int_0^{\sqrt{3}} [4 - x^2]^2 dx$$

$$V_2 = V_{abce} = \pi (1)^2 (\sqrt{3})$$

$$V = V_1 - V_2 = \pi \left[\int_0^{\sqrt{3}} [4 - x^2]^2 dx - \sqrt{3} \right]$$

$$= \pi \int_0^{\sqrt{3}} [(4 - x^2)^2 - (1)^2] dx$$